

September 21, 1955

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To: [REDACTED]

Re: Major Processing, Printing, and Minicard Equipment on Project H

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On May 30 a list of equipment was submitted for this project amounting to a price to the customer of [REDACTED]. Allocation of funds amounting to [REDACTED] at a fixed price was received, and additional funds on fixed price basis were received for Miscellaneous Auxiliary Equipment [REDACTED] and Installation [REDACTED]. A further allotment of money on a CPFF basis amounting [REDACTED] cover Special Engineering Costs has been received.

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A change in processing methods has brought a change in the processing equipment required. Furthermore, the original plan for Minicard recording was at unit magnification for all film sizes, and this has been changed by general agreement to be done at two magnifications other than unity. Hence, a revised camera design has been necessary, and an additional camera for the second magnification is now required.

While an increase in funds is not being requested, it is necessary for our customer to consent to the items now on the revised list.

Also included here are the "Basic Products" and a proposed time schedule for their delivery. It is presently planned to submit the enclosed data in person the 23rd of September.

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[REDACTED]  
Enclosures

Apparatus Research and Development

## A. BASIC EQUIPMENT (Fixed Price)

Total -

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Original List (May 30, 1955)

- (3) 70mm Continuous Film Processors
- (3) 70mm Continuous Film Printers
- 1 20-inch Continuous Paper Processor
- 1 9½-inch Continuous Film Processor
- 1 9½-inch Step & Repeat Printer
- 1 9½-inch Continuous Contact Printer
- 1 Cut Sheet Processor (a)
- 1 Minicard Equipment (1 camera,  
1 processor, 1 chopper,  
1 sorter)

## Installation Costs

## Misc. Auxiliary Equipment

Revisions

(1) The Cut Sheet Processor (a) has been dropped because of technical reasons and has been replaced by the following:

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- 1 9½-inch Continuous Film Processor
- 1 9½-inch Continuous Paper Processor
- 4 [REDACTED]
- 1 Cut Sheet Step and Repeat Adapter  
(Engineering drawings only)

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(2) In addition, the quantities of printers and processors has been increased (to accommodate installations required) by the following:

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1 70mm Continuous Film Processor

1 70mm Continuous Film Printer

(3) Small Items for Minicard Equipment  
(listed above)

Under Miscellaneous Auxiliary Equipment

(4) Changes in the use of Minicards has eliminated the contact type of camera shown in the original list, and added two cameras working at magnifications other than unity.

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2 Optical Minicard Cameras

1 Minicard Duplicator

1 Minicard Viewer

1 Flexowriters

Credit

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Plant Equipment

Total

Breakdown of Plant Equipment

Purchase and install chemical mixing equipment; install and connect processing machines; purchase tables, spooling equipment; make and install splicers, choppers, viewers, etc.; make racks for film; obtain and install equipment for test darkroom; buy control equipment such as sensitometer, densitometers; buy safe-lights and install; make drain pans for processing machines, etc.

Silver recovery units are not planned at present but may be added at a later date if additional funds are approved by customer.

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B. ENGINEERING COSTS (Covered by CPFF)

[Redacted]

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Included are:

Engineering of Minicards as a system for this application.

Engineering of special parts of cameras for particular recording method.

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[Redacted]

MAJOR PROCESSING AND PRINTING EQUIPMENT

In the material which follows the assumption is made that the single-layer emulsion with interrupted development is used for the original negative stock. It follows that single-layer emulsion under continuous development can be handled with the same equipment but with a shorter elapsed time for the product. The requirements for the two-layer emulsion have not been detailed and will not be considered in what follows.

(1) The product which is provided by the processing station consists of a basic product group and a supplementary group.

(2) The basic product group consists of:

- a. The original negative
- b. One master positive
- c. One dupe negative
- d. One set of prints

(3) The supplementary group consists of:

- a. Two dupe negatives
- b. One set of prints

(4) Products leaving the processing station will be packaged in the following manners:

- a. The original negative will be in cut-sheet form, and each frame will be placed in a clear acetate cover.
- b. The master positive will be in roll form on spools which will accommodate 1,000 feet of film or less. The master positive will be in sequential frame order.
- c. The dupe negative will be in sequential frame order but in rolls accommodating approximately 100 feet of film exclusive of leader and trailer.
- d. The prints will be provided in cut sheet form and will be packaged in sequential frame order. They will further be packaged in groups which correspond to the equivalent 100-foot rolls of the dupe negative.

(5) In establishing the major equipment requirement list certain assumptions were made. If these assumptions turn out to be invalidated, some minor changes may be called for in the output times for the product. The assumptions are the following:

- a. The equipment requirements should be based on handling a maximum footage of 9,000 feet of original negative in two rolls.
- b. Interrupted development will take place on the original negative.
- c. Continuous processing (in contrast to cut sheet) will be used.
- d. No frames will be discarded during the processing and printing operations. (The option for modifying this or keeping it rests with the customer.)
- e. It is further assumed that no remakes will be made for the times which are determined to yield the final products.
- f. No rectified prints will be provided (rectifiers do not exist and would have to be designed and built).
- g. It is assumed that the processing machines which are used for handling original negative material may be used for some duplicate material processing.
- h. It is assumed that right- and lefthand rolls of the original negative stock can be intermixed in the original negative processing stages for more rapid handling.

(6) The basic output data of machines and handling stations are assumed to be the following:

- a. Original negatives will be processed at a rate of five feet per minute.
- b. Paper prints, master positives, and dupe negatives will be processed at a rate of ten feet per minute.
- c. The continuous contact printer will operate at a rate of 60 feet per minute.
- d. Processing examinations will take place at a rate of five feet per minute when infrared image converters are used, and at approximately eight feet per minute with room light.
- e. It is assumed that splicing and chopping operations will be fast enough so as to prevent any delay to the processing or sorting activities.

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The handling times for the last two operations are merely estimates, and so only experience will indicate whether they are higher or lower than the indicated figures.

(7) The basic equipment requirements for the processing stage, exclusive of Minicard, are covered under the major processing and printing equipment lists. It has been established that this group is a basic economic one since any reduction in the number of machines will cause the operation of the station to suffer from both a time and cost standpoint.

A second set of equipment, which differs from the first by the addition of two processing machines for original negative, may also be considered.

Both equipment groups are considered below in terms of the estimated elapsed times which will be required for producing the several products. The making of Minicards is not included in these time schedules.

<u>Basic Product Group:</u>	<u>Basic Equipment</u>	<u>Basic Equipment</u>
	<u>Group I</u>	<u>Group II (Group I plus Two Orig. Neg. Processors)</u>
	<u>Product is out at:</u>	<u>Product is out at:</u>

Basic Product Group:

1 Original Negative	36 hours	22 hours
1 Master Positive	40 "	26 "
1 Dupe Negative	50 "	30 "
1 Print	56 "	36 "

Supplementary Group:

2 Dupe Negatives	64 hours	42 hours
1 Print	68 "	45 "

The times involved in the above table assume efficient machine utilization and so are inherently based on three-shift operation. If less than three shifts are used, the overall elapsed time will be greater than the times indicated. For footages which are less than the 9,000 feet shown (two 4,500-foot rolls), the throughput times will be shorter.

The difference in cost between the two equipment groups is approximately [redacted] for the processors and is in addition to installation and operation costs. These machines can be procured at a later date, but may be involved in a delay depending on availability of the basic models.

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BASIC EQUIPMENT - GROUP I

- 2     9 $\frac{1}{2}$ -inch Film Processors
- 1     9 $\frac{1}{2}$ -inch Paper Processor
- 1     20-inch Paper Processor
- 1     9 $\frac{1}{2}$ -inch Continuous Contact Printer
- 1     9 $\frac{1}{2}$ -inch Step and Repeat Contact Printer

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BASIC EQUIPMENT - GROUP II

All of Group I plus

- 2     9 $\frac{1}{2}$ -inch Continuous Film Processors